What is claimed is:

1. A single-mode optical fiber suitable for a WDM (Wavelength Division Multiplexing) system, comprising:

(a) a first core region positioned in the center of cross section and having a radius r_1 from the center and a relative refractive index difference $\triangle_1$;

(b) a second core region surrounding the first core region and having a radius r_2 from the center and a relative refractive index difference $\triangle_2$;

(c) a third core region surrounding the second core region and having a radius r_3 from the center and a relative refractive index difference $\triangle_3$; and

(d) a clad region surrounding the third core region and having a radius r_4 from the center and a relative refractive index difference $\triangle_4$,

(e) wherein the radii of the regions have a relation of $r_1 < r_2 < r_3 < r_4$, and the relative refractive index differences of the regions have relations of $\triangle_1 > \triangle_2$, and $\triangle_2 < \triangle_3$;

(here, $\triangle_1(\%)=[(n_1-n_c)/n_c]\times 100$, $\triangle_2(\%)=[(n_2-n_c)/n_c]\times 100$, $\triangle_3(\%)=[(n_3-n_c)/n_c]\times 100$, n_1: a reflective index of the first core region, n_2: a reflective index of the second core region, n_3: a reflective index of the third core region, n_c: a reflective index of the clad region)

(f) wherein the optical fiber uses a wavelength region from 1460 to 1625 nm, and has a dispersion value of 0.1 to 3.0 ps/nm-km at 1460 nm, 3.0 to 5.5 ps/nm-km at 1550 nm, and 4.5 to 8.0 ps/nm-km at 1625 nm.

2. The single-mode optical fiber according to claim 1,

wherein the optical fiber has a positive dispersion slope in the wavelength band for use.

3. The single-mode optical fiber according to claim 2,

wherein the optical fiber has a dispersion slope of 0.023 to 0.05 ps/nm-km^2 at 1550 nm.

4. The single-mode optical fiber according to claim 3,

wherein the optical fiber has an effective section area of 35 to 50μm^2 at 1550 nm.

5. The single-mode optical fiber according to claim 3,

wherein the optical fiber has an effective section area of 35 to 50μm^2 at 1460 nm.

6. The single-mode optical fiber according to claim 4 or 5,

wherein the optical fiber has a cutoff wavelength of 1450 nm or below.

7. The single-mode optical fiber according to claim 4 or 5,

wherein a zero-dispersion wavelength is located at 1460 nm or below.

8. The single-mode optical fiber according to claim 4 or 5,

wherein the optical fiber has a dispersion value of 0.3 to 2.4 ps/nm-km at 1460 nm.

9. The single-mode optical fiber according to claim 4 or 5,

wherein the optical fiber has a dispersion value of 3.2 to 5.2 ps/nm-km at 1550 nm.

10. The single-mode optical fiber according to claim 4 or 5

wherein the optical fiber has a dispersion value of 4.8 to 7.7 ps/nm-km at 1625 nm.

11. The single-mode optical fiber according to claim 10,

wherein a bending loss is 0.5dB or less at 1625 nm under the condition of a bending radius of 30mm, 100turns.

12. The single-mode optical fiber according to claim 1,

i) wherein the first core region has a radius r_1=3.05±0.6μm and a relative refractive index difference $\triangle_1(\%)$= 0.54±0.03%;

ii) wherein the second core region has a radius r_2=5.38±0.6μm and a refractive index difference $\triangle_2$= -0.20±0.03%; and

iii) wherein the third core region has a radius r_3=9.96±0.6μm and a specific refractive index difference $\triangle_3$= 0.07±0.03%.

13. The single-mode optical fiber according to claim 1,

i) wherein the first core region has a radius r_1=3.05±0.6μm and a relative refractive index difference $\triangle_1$(%)= 0.55±0.03%;

ii) wherein the second core region has a radius r_2=5.75±0.6μm and a relative refractive index difference $\triangle_2$ = -0.18±0.03%; and

iii) wherein the third core region has a radius r_3=10.79±0.6μm and a relative refractive index difference $\triangle_3$ = 0.09±0.03%.

14. The single-mode optical fiber according to claim 1,

i) wherein the first core region has a radius r_1=3.12±0.6μm and a relative refractive index difference $\triangle_1$(%)= 0.53±0.03%;

ii) wherein the second core region has a radius r_2=5.56±0.6μm and a relative refractive index difference $\triangle_2$ = -0.23±0.03%; and

iii) wherein the third core region has a radius r_3=9.92±0.6μm and a relative refractive index difference $\triangle_3$ = 0.10±0.03%.

15. The single-mode optical fiber according to claim 1,

i) wherein the first core region has a radius r_1=3.24±0.6μm and a relative refractive index difference $\triangle_1$(%)= 0.48±0.03%;

ii) wherein the second core region has a radius r_2=5.72±0.6μm and a relative refractive index difference $\triangle_2$ = -0.17±0.03%; and

iii) wherein the third core region has a radius r_3=8.54±0.6μm and a relative

refractive index difference $\triangle_3 = 0.15 \pm 0.03\%$.

16. The single-mode optical fiber according to claim 1,

i) wherein the first core region has a radius $r_1=3.37 \pm 0.6\mu m$ and a relative refractive index difference $\triangle_1(\%)= 0.50 \pm 0.03\%$;

ii) wherein the second core region has a radius $r_2=5.77 \pm 0.6\mu m$ and a relative refractive index difference $\triangle_2 = -0.25 \pm 0.03\%$; and

iii) wherein the third core region has a radius $r_3=9.35 \pm 0.6\mu m$ and a relative refractive index difference $\triangle_3 = 0.14 \pm 0.03\%$.

17. The single-mode optical fiber according to claim 1,

i) wherein the first core region has a radius $r_1=3.18 \pm 0.6\mu m$ and a relative refractive index difference $\triangle_1(\%)= 0.51 \pm 0.03\%$;

ii) wherein the second core region has a radius $r_2=6.18 \pm 0.6\mu m$ and a relative refractive index difference $\triangle_2 = -0.19 \pm 0.03\%$; and

iii) wherein the third core region has a radius $r_3=8.65 \pm 0.6\mu m$ and a relative refractive index difference $\triangle_3 = 0.14 \pm 0.03\%$.

18. A single-mode optical fiber suitable for a WDM (Wavelength Division Multiplexing) system, comprising:

(a) a first core region positioned in the center of cross section and having a radius r_1 from the center and a relative refractive index difference $\triangle_1$;

(b) a second core region surrounding the first core region and having a radius r_2 from the center and a relative refractive index difference Δ_2;

(c) a third core region surrounding the second core region and having a radius r_3 from the center and a relative refractive index difference Δ_3; and

(d) a clad region surrounding the third core region and having a radius r_4 from the center and a relative refractive index difference Δ_4,

(e) wherein the radii of the regions have a relation of $r_1 < r_2 < r_3 < r_4$, and the relative refractive index differences of the regions have relations of $\Delta_1 > \Delta_2$, and $\Delta_2 < \Delta_3$;

(here, $\Delta_1(\%)=[(n_1-n_c)/n_c]\times 100$, $\Delta_2(\%)=[(n_2-n_c)/n_c]\times 100$, $\Delta_3(\%)=[(n_3-n_c)/n_c]\times 100$, n_1: a reflective index of the first core region, n_2: a reflective index of the second core region, n_3: a reflective index of the third core region, n_c: a reflective index of the clad region)

(f) wherein the optical fiber uses wavelength region from 1460 to 1625 nm, and has a dispersion value of 0.1 to 3.0 ps/nm-km at 1460 nm, 3.0 to 5.5 ps/nm-km at 1550 nm, and 4.5 to 8.0 ps/nm-km at 1625 nm;

(g) wherein a dispersion slope at 1550 nm is 0.023 to 0.05 ps/nm-km^2;

(h) wherein an effective section area at 1550 nm is 35 to 50μm^2.

19. The single-mode optical fiber according to claim 18,

wherein the optical fiber has an effective section area of 35 to 50μm^2 at 1460 nm.

20. The single-mode optical fiber according to claim 18,

wherein the optical fiber has a cutoff wavelength of 1450 nm or below.

21. The single-mode optical fiber according to claim 18,

wherein a zero-dispersion wavelength is located at 1460 nm or below.

22. The single-mode optical fiber according to claim 18,

wherein the optical fiber has a dispersion value of 0.3 to 2.4 ps/nm-km at 1460 nm.

23. The single-mode optical fiber according to claim 18,

wherein the optical fiber has a dispersion value of 3.2 to 5.2 ps/nm-km at 1550 nm.

24. The single-mode optical fiber according to claim 18,

wherein the optical fiber has a dispersion value of 4.8 to 7.7 ps/nm-km at 1625 nm.

25. The single-mode optical fiber according to claim 18,

wherein a bending loss is 0.5dB or less at 1625 nm under the condition of a bending radius of 30mm, 100turns.

26. An optical transmission line in which the single-mode optical fiber

defined in any of claims 1 to 18 is adopted.

27. An optical transmission system in which the optical transmission line defined in claim 26 is adopted in at least a part of an optical transmission path.